INTERNATIONAL SEARCH REPORT

International application No.
PCT/US04/43499

A. CLASSIFICATION OF SUBJECT MATTER
IPC(7) : C12Q 1/68; C12P 19/34; C07H 21/02, 21/04
US CL : 435/6, 91.2; 536/23.1, 23.5, 23.7, 23.72, 24.1, 24.2, 24.31, 24.32, 24.33
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 435/6, 91.2; 536/23.1, 23.5, 23.7, 23.72, 24.1, 24.2, 24.31, 24.32, 24.33

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Please See Continuation Sheet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 2001/0053519 A1 (FODOR et al) 20 December 2001 (20.12.2001), especially page 10, paragraphs 0101, 0108 and 0109, and page 12, paragraphs 0122, 0123, 0124.	16-20 --- 1-15
Y	AHERN, H. Biochemical, Reagent Kits Offer Scientists Good Return on Investment. The Scientist. July 1995, Vol. 9, No. 155, page 20-24.	1-15

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search
10 May 2005 (10.05.2005)

Date of mailing of the international search report
27 MAY 2005

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Form PCT/ISA/210 (second sheet) (January 2004)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US04/43499

Continuation of B. FIELDS SEARCHED Item 3:
DIALOG: MEDLINE, CA, BIOSIS, EMBASE, SCISEARCH; WEST: US, WO, JP, EP patents
search terms: HPV, primers, probes, amplification, capture, biochip, array, microarray

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US04/43411

Box No. I Nucleotide and/or amino acid sequence(s) (Continuation of item 1.b of the first sheet)

1. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, the international search was carried out on the basis of:

   a. type of material
   - ☒ a sequence listing
   - ☐ table(s) related to the sequence listing

   b. format of material
   - ☒ in written format
   - ☒ in computer readable form

   c. time of filing/furnishing
   - ☒ contained in the international application as filed
   - ☒ filed together with the international application in computer readable form
   - ☐ furnished subsequently to this Authority for the purposes of search

2. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

3. Additional comments:

AMENDED CLAIMS

[received by the International Bureau on 11 July 2005 (11.07.2005);
original claims 1, 8 and 16 amended, remaining claims unchanged]

1. A multiplex diagnostic kit that comprises:

a plurality of amplification primer pairs, and a plurality of extension primers, wherein each of the plurality of amplification primer pairs has a sequence such that

(a) a plurality of amplicons produced from a target nucleic acid using the plurality of amplification primer pairs, respectively, includes a mutated position in a target nucleic acid;

(b) the plurality of amplicons is produced in a PCR reaction using the same amplification profile;

and wherein each of the plurality of extension primers has a sequence such that

(c) each of the plurality of extension primers specifically hybridizes to each of the plurality of amplicons at the same extension temperature, respectively, such that the 3'-end of each of the extension primers corresponds to a complementary position of the mutated position, respectively; and

(d) selective primer extension for each of the plurality of extension primers is achieved at the same extension temperature.

2. The multiplex diagnostic kit of claim 1 further comprising a biochip to which are coupled in a plurality of distinct positions a plurality of distinct capture probes, respectively, and wherein each of the plurality of capture probes hybridizes with a portion of each of the extension primers, respectively.

3. The multiplex diagnostic kit of claim 2 wherein each of the plurality of the distinct capture probes has a unique sequence distinct from the target nucleic acid.

4. The multiplex diagnostic kit of claim 1 further comprising a DNA-dependent DNA polymerase.

5. The multiplex diagnostic kit of claim 1 wherein the plurality of amplification primer pairs has a plurality of forward primers and a plurality of backward primers, respectively, and wherein the kit includes at least two forward amplification primers having a sequence according to SEQ ID Ax and Ay, and at least two backward

amplification primers having a sequence according to SEQ ID Bx and By, wherein x and y are integers between 1 and 24 and not the same.

6. The multiplex diagnostic kit of claim 1 wherein the plurality of extension primers include at least two extension primers having a sequence according to SEQ ID Cx and Cy, wherein x and y are integers between 1 and 24 and not the same.

7. The multiplex diagnostic kit of claim 1 further comprising an instruction to perform the PCR reaction and primer extension in a single tube.

8. A multiplex diagnostic kit that comprises:
at least two forward amplification primers having a sequence according to SEQ ID Ax and Ay, at least two backward amplification primers having a sequence according to SEQ ID Bx and By, and at least two extension primers having a sequence according to SEQ ID Cx and Cy; and
wherein x and y are integers between 1 and 24 and not the same.

9. The multiplex diagnostic kit of claim 8 further comprising an instruction to perform a multiplex PCR using the at least two forward amplification primers and the at least two backward amplification primers using the same amplification profile.

10. The multiplex diagnostic kit of claim 9 further comprising an instruction to perform a primer extension reaction using the at least two extension primers at the same extension temperature.

11. The multiplex diagnostic kit of claim 10 further comprising an instruction to perform the multiplex PCR and the extension reaction in a single tube.

12. The multiplex diagnostic kit of claim 8 further comprising a biochip to which are coupled in a plurality of distinct positions a plurality of distinct capture probes, respectively, and wherein each of the plurality of capture probes hybridizes with a portion of each of the extension primers, respectively.

13. The multiplex diagnostic kit of claim 12 wherein each of the plurality of the distinct capture probes has a unique sequence distinct from a target nucleic acid to which the amplification primers bind.

14. The multiplex diagnostic kit of claim 8 further comprising at least one of a reagent and an enzyme.

15. The multiplex diagnostic kit of claim 8 wherein the amplification primers and the extension primers are specific towards an HPV virus.

16. A synthetic nucleic acid that has less than sixty nucleotides and comprising an HPV recognition sequence selected from the group consisting of SEQ ID Ax, SEQ ID Bx, and SEQ ID Cx, wherein X is an integer between 1 and 24, wherein no more than two nucleotides in the HPV recognition sequence are replaced by N.

17. The synthetic nucleic acid of claim 16 having SEQ ID Cx and further comprising a plurality of nucleotides at the 5'-terminus that have less than 60% homology to a target sequence to which the nucleic acid hybridizes.

18. The synthetic nucleic acid of claim 16 wherein SEQ ID Ax, SEQ ID Bx, and SEQ ID Cx are complementary to an HPV mutant.

19. The synthetic nucleic acid of claim 16 having less than 40 nucleotides.

20. The synthetic nucleic acid of claim 16 consisting of the HPV recognition sequence.